Committee: World Health Organization (WHO)

Topic: Addressing the widespread outbreak of zoonotic viruses

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Position: Deputy President

Personal Introduction

Dear Delegates,

My name is Malak Hamidh and I prefer to be called by my nickname Angie and I feel ecstatic to be serving as the deputy president in the World Health Organisation in CSMUN 2020. I am 15 years old and I attend Campion School. I have attended multiple MUN conferences as a delegate and was also lucky enough to participate in conferences abroad. I remember my first time attending a conference as a delegate. I was very nervous,yet excited. I was not familiar with how to communicate my ideas, how to come up with clauses or how to format a resolution, but I can proudly say that by the end of my first conference I was able to be a diplomatic delegate and that was because of my chairs, who constantly encouraged me and I aspire to be the same.

This year's topic about addressing the outbreak of zoonotic viruses seems to be quite ideal in regards with the situation that the world is in. It is a very extensive topic, yet very interesting as you explore through years of research on outbreaks of zoonotic viruses. I hope this study guide will be able to give you an idea on the topic and I hope you also make your own personal research in order to come up with possible and creative solutions. I look forward to working with you and good luck!

Yours truly,

Malak Hamidh (ahamidh@campion.edu.gr)

Topic Introduction

Zoonotic viruses are diseases or viruses that are transmitted from animals to humans. Throughout the centuries outbreaks of zoonotic viruses have arisen therefore causing socioeconomic crises. Currently, 75% of emerging infectious diseases are originally found in animals and a proactive approach is required to deal with the prevention of future outbreaks.[1]

Since 2011, we have come across a dramatic increase of zoonotic viruses due to human behaviour, global travel and mass transit and have faced 758 epidemics worldwide. Most recent outbreaks include SARS- CoV in 2002-2004, Ebola (EBOV) in 1976 and is ongoing, latest outbreak in 2018,H1N1 in 2009, Zika Virus (ZIKV) in 2015- present and COVID-19 2019- present[2]. So far multiple projects and organizations have been established in order to detect and characterize viruses to prevent outbreaks. However, more action and protocols are required in order to prevent future outbreaks of any disease as outbreaks could lead to epidemics and pandemics causing multiple political, economic and social problems.

Definition of key terms

Zoonosis

A zoonosis is any disease or infection that is naturally transmissible from vertebrate animals to humans. Animals thus play an essential role in maintaining zoonotic infections in nature.[3]

1 "Zoonotic Diseases." *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 14 July 2017, www.cdc.gov/onehealth/basics/zoonotic-diseases.html.

2 "Managing epidemics." *World Health Organisation*, World Health Organisation, 2018, https://www.who.int/emergencies/diseases/managing-epidemics-interactive.pdf

3 "Zoonoses." *World Health Organization*, World Health Organization, 19 July 2017, www.who.int/topics/zoonoses/en/#:~:text=A zoonosis is any disease,zoonotic infections in nature.

Vector

An organism that does not cause disease itself but which spreads infection by conveying pathogens from one host to another. Species of mosquito serve as vectors for the disease Malaria.[4]

Reservoir

Any person, animal, plant, soil or substance in which an infectious agent normally lives and multiplies.[5]

Outbreak

An outbreak is a greater-than-anticipated increase in the number of endemic cases. It can also be a single case in a new area. If it's not quickly controlled, an outbreak can become an epidemic.[6]

Pandemic

"An epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people"[7]

Epidemic

An outbreak of a disease that spreads rapidly among the people of an area.

Endemic:

4 "Vector (Biology)." *ScienceDaily*, ScienceDaily www.sciencedaily.com/terms/vector_(biology).htm#:~:text=Traditionally in medicine, a vector,for the deadly disease Malaria.

5 William C. Shiel Jr., MD. "Definition of Reservoir of Infection." *MedicineNet*, MedicineNet, 25 Jan. 2017, www.medicinenet.com/script/main/art.asp?articlekey=14969.

6 Person, et al. "What's the Difference between a Pandemic, an Epidemic, Endemic, and an Outbreak?" *Intermountainhealthcare.org*, 2 Apr. 2020, intermountainhealthcare.org/blogs/topics/live-well/2020/04/whats-the-difference-between-a-pandemic-an-epidemic-endemic-and-an-outbreak/.

7 "The Classical Definition of a Pandemic Is Not Elusive." *World Health Organization*, World Health Organization, 1 July 2011, www.who.int/bulletin/volumes/89/7/11-088815/en/#:~:text=A pandemic is defined as,are not considered pandemics.

A characteristic of a particular population, environment, or region.The disease is present in a community at all times but in relatively low frequency.[8]

Globalization:

Globalization or the increased interconnectedness and interdependence of peoples and countries is generally understood to include two inter-related elements: the opening of international borders to increasingly fast flows of goods, services, finance, people and ideas: and the changes in institutions and policies at national and international levels that facilitate or promote such flows. Globalization has the potential for both positive and negative effects on development and health.[9]

Select Agent:

Select agents are biological agents and toxins that have been determined to have the potential to pose a severe threat to public health and safety, to animal and plant health, or to animal or plant products.[10]

Epidemiology:

The study (scientific, systematic, and data-driven) of the distribution (frequency, pattern) and determinants (causes, risk factors) of health-related states and events (not just diseases) in specified populations (neighborhood, school, city, state, country, global).[11]

Superspreaders:

A highly infectious person who spreads the agent of an infectious disease to many other people.[12]

8 William C. Shiel Jr., MD. "Definition of Endemic." *MedicineNet*, MedicineNet, 4 Dec. 2018, www.medicinenet.com/script/main/art.asp?articlekey=3234.

9 "Globalization." *World Health Organization*, World Health Organization, 1 Dec. 2010, www.who.int/topics/globalization/en/.

10 "DSAT - What Is a Select Agent?" *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 17 June 2016, www.cdc.gov/cpr/dsat/what-is-select-agents.htm.

11"What Is Epidemiology?" *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 17 June 2016, www.cdc.gov/careerpaths/k12teacherroadmap/epidemiology.html.

12 William C. Shiel Jr., MD. "Definition of Super Spreader." *MedicineNet*, MedicineNet, 7 Sept. 2018, www.medicinenet.com/script/main/art.asp?articlekey=22951.

Background Information

Zoonotic viruses are infectious diseases of humans that originate in animals and are caused by transmissible agents(viruses, bacteria ,parasites) that are transmitted from animals to humans. A virus must have similar receptors to a human cell and it must be specific so there must be some sort of adaptation in order to bind with a human cell and be transmitted from one person to another.

How they are transmitted

Zoonotic viruses are transmitted in various ways. Transmission and emergence can happen from a live animal reservoir[13] to humans, an intermediate amplifying host or insect vectors. Any direct contact with the saliva, blood, urine, mucous, feces, or other body fluids of an infected animal is a way in which viruses can spread. Indirect contact such as touching contaminated surfaces is another possible method of transmission.
In addition, sometimes vectors such as mosquitoes and ticks can transmit viruses from animals to humans. Additionally, 1 in 6 Americans get sick from eating contaminated food, which can either be undercooked or raw or laced with animal faeces.[14]
Our behaviour as humans is a problem as we have managed to encroach on every corner of the planet and into the natural world where naturally we wouldn't come into contact with some of these viruses. The more often we do that, the more we disrupt habitats and the more we become into close contact or proximity to these viruses and therefore the more prone we are to mutations that would benefit the virus in terms of replicating in a human.

Global travel also increases the rates at which the virus spreads. Ever since the aircraft was invented in 1903 it has allowed travel between continents. It could be seen that air travel has thoroughly increased the transmission of different zoonotic viruses due to the fact that 50% of the air in the airplane is recirculated back into the cabin thus increasing the possibility of passengers catching the disease or virus. Due

13 "Principles of Epidemiology." *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 18 May 2012, www.cdc.gov/csels/dsepd/ss1978/lesson1/section10.html.
14 "Zoonotic Diseases." *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 14 July 2017, www.cdc.gov/onehealth/basics/zoonotic-diseases.html.

to travel, more people from different countries where different viruses are prevalent mix, causing super- spreading or the transmission of different viruses.
Moreover, climate change contributes to the spread of zoonotic diseases,for example the geographic range of vectors such as ticks and mosquitoes are changed. Vectors travel to high altitudes and regions farther from the equator increasing the likelihood of the spread of a zoonotic disease.

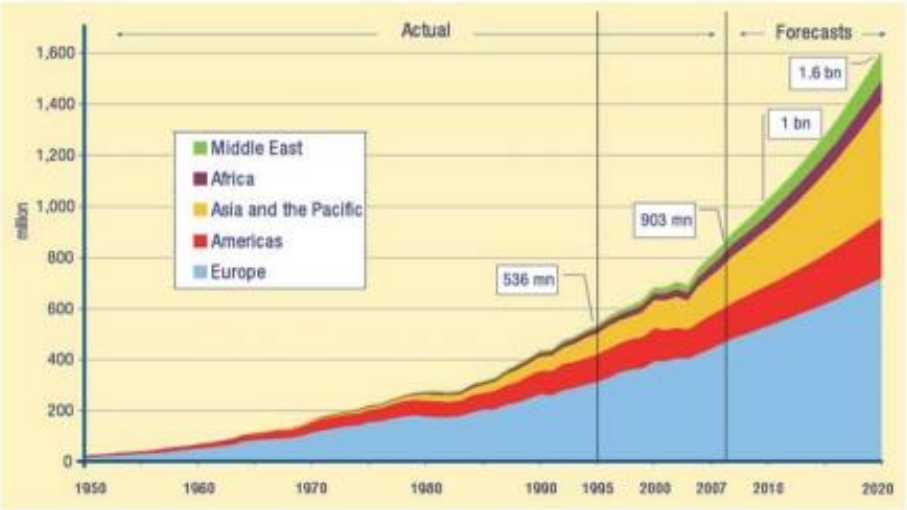

Figure 1: Increase of global travel over the years

Major outbreaks and how they were dealt with

Bubonic Plague

The Bubonic Plague is a disease that affects humans and is caused by a bacterium that is passed by getting bitten by a rodent flea. It is a deadly disease as it has a fatality rate from 30% to 60%.There was a bubonic plague epidemic in 1346-1353 It originated in China and brought over to Europe through merchant ships and quickly spread killing millions of people. It is estimated that it managed to kill 50 million people in Europe- which was 60% of Europe's population. Since then, there have been outbreaks of the bubonic plague. For example, in India in August 1994 there was an outbreak of the bubonic and pneumonic plague which lasted a couple of months. This caused $600 million dollars worth of economic damage as it was obligatory to impose travel restrictions. Outbreaks still seem to occur specifically in

Africa and Asia, but there has been a development of antibiotics for treating the plague, making it more manageable.

Yellow fever

In 1648, there was the first evidence of yellow fever in the Americas by Mayan manuscripts when they were imported from West Africa through ships. Throughout 1668- 1699, there were outbreaks of Yellow Fever in Barbados, Cuba, Mexico and the United States of America. In 1898, the Reed Yellow Fever Commission was established and by 1900 The Reed Yellow Fever Commission proved that yellow fever was transmitted by vector- mosquitoes. The case-fatality of severe yellow fever is 30%- 60%.By 1930, two yellow fever vaccines were developed (17D and the French neurotropic vaccine).The Eliminate Yellow Fever Epidemics was set up in 2017 by WHO, Gavi and UNICEF to face yellow fever's changing epidemiology, resurgence of mosquitoes, and the increased risk of urban outbreaks and international spread.[15] Outbreaks of yellow fever, which often occur when the disease is introduced to densely populated urban areas, can have disruptive effects on economies and health care systems. [16]

Spanish Flu

The Spanish Flu emerged on March 11, 1918 and ended in April, 1919. The origin of the Spanish Flu was in Kansas, where there is a high population of hog farmers. It was first transmitted abroad to France by soldiers during World War 1. It killed 50-100 million people and had three waves, the second wave being the strongest. This virus affected countries worldwide. Immediate lockdown of all public spaces occured and gauze masks were to be worn when leaving the house. University of Minnesota developed two vaccines however neither were effective as neither actually contained

15 "Eliminate Yellow Fever Epidemics (EYE) 2017-2026." *World Health Organization*, World Health Organization, www.who.int/news-room/initiatives/eliminate-yellow-fever-epidemics-(eye)-2017-2026.

16 "Global Health - Newsroom - Yellow Fever." *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 14 Sept. 2018, www.cdc.gov/globalhealth/newsroom/topics/yellowfever/index.html.

influenza virus. By 1918, India had 10-17 million people deaths because of the virus which resulted in a loss of 12.8% in India's GDP.

SARS

It was first detected in 2002 Guangdong,China. There were superspreaders who spread it to many people worldwide by air travel. This affected China, Colombia, Canada, Singapore and Taiwan. Transmission is primarily from person to person, mainly through droplets. This outbreak cost the global economy $54 billion according to the World Bank. There was a lack of communication between China and different countries.It cost China, Taiwan, Hong Kong, and Singapore $200 billion and Canada alone $1.5 billion. In March 2003, the CDC activated its Emergency Operation Center and issued guidelines on how to manage the SARS cases in healthcare and in public facilities. A quarantine was imposed on people meeting planes, cargo ships and cruise ships.

Ebola (EBOV)

Ebola was first recorded in 1976 in the Democratic Republic of Congo. Prior to 2013 the outbreaks were sporadic. The 2014- 2016 Ebola outbreak in West Africa was the largest outbreak to date since the discovery of the virus. In September 2014, there was the first confirmed case of Ebola in Texas, USA coming from Liberia and in October 2014 a health worker was tested positive for Ebola in the United States. Liberia, Sierra Leone, Guinea and Nigeria were countries that were the most affected. Common symptoms of Ebola are fever, weakness and gastrointestinal symptoms.What makes it fatal is the fact that it causes internal and external bleeding as well as impaired liver and kidney dysfunction. That is why the average EVD fatality rate is around 50%. The World Health Organisation and the United Nations has provided $495 to $600 million on immediate humanitarian costs. The Low Ebola case amounted to US$3.8 billion by the end of 2015 (2013 dollars) across West

Africa. The High Ebola case amounted to $32.6 billion over the two years.[17] WHO has developed an experimental vaccine rVSV-ZEBOV and is being used in the ongoing 2019 Ebola outbreak in Democratic Republic of Congo.

Zika Virus

Zika virus disease is caused by a virus transmitted by Aedes mosquitoes. Zika virus was first identified in 1952 in Uganda and Tanzania. The first outbreak of Zika Virus outside of Africa and Asia happened in 2007 in the Federated States of Micronesia. WHO estimated that 4 million people were infected with Zika Virus in Latin America and the Caribbean by 2017.As of 2020, virus activity continues in the Caribbean, most of Latin America, Central Africa, India, Indonesia, Malaysia, Cambodia, and Papua New Guinea.[18] The Zika Virus epidemic cost the Caribbean and Latin America $3.5 billion. According to WHO, US$122.1 million are necessary to implement the Zika Strategic Response Plan, July 2016 to December 2017. There is no current treatment and so WHO has advised for protection against mosquito bites especially for pregnant women and young children. Zika virus can cause neurological problems for unborn babies and young children and can also increase the risk of the infant being born with microcephaly.

Bovine spongiform encephalopathy (BSE)

BSE, commonly known as Mad Cow Disease, is a progressive neurological disorder of cattle that results from infection which began in 1986.[19]It is transmitted by consumption of BSE- contaminated meat. 97% of BSE cases have been reported from the United Kingdom. However, endemic cases have also been reported in other European countries including: the Republic of Ireland, Switzerland, France, Liechtenstein, Luxembourg, Netherlands, Portugal and Denmark. The UK lost £700 million per year from 1986- 2009 and the USA lost 11 billion dollars from 2003-

17"The Economic Impact of the 2014 Ebola Epidemic." *Google*, Google, books.google.gr/books/about/The_Economic_Impact_of_the_2014_Ebola_Ep.html?id=yDbtBQAAQBAJ&printsec=frontcover&source=kp_read_button&redir_esc=y#v=onepage&q&f=false.

18"Zika:WhereAreWeNow?"*ContagionLive*,www.contagionlive.com/publications/contagion/2018/october/zika-where-are-we-now.

19 "Bovine Spongiform Encephalopathy (BSE)." *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 9 Oct. 2018, www.cdc.gov/prions/bse/index.html.

2007.The British Government instituted a ban on feeding ruminant protein, removal of some "high risk" materials, for example the brain and intestines from cattle at slaughter,and a ban on cattle over 30 months of age from being used for food.

Avian influenza (HPAI)

The Avian influenza is caused by wild aquatic birds that may later come in contact with domestic poultry.The mortality rate of HPAI is 60%. The world economy lost $3 trillion. Highly pathogenic Avian influenza (HPAI H5H1) epidemic in 7 main countries (Bangladesh, China, Egypt, India,Indonesia, Malaysia and Vietnam).In Asia alone the pandemic cost $10 billion. In order to deal with the epidemic, the Department of Veterinary Services in Malaysia came out with a manual for the control of HPAI. It suggests extermination of birds using 30% carbon dioxide or chemicals that would be added to drinking water. The birds then would be buried instead of being burned as environmental problems could arise. [20] According to the United States Department of Agriculture, the US was obligated to pay $850 million for response activities for the HPAI outbreak. Importation of live poultry from regions experiencing HPAI outbreaks came to halt resulting in a loss in the world economy.

HIV (Human Immunodeficiency Virus)

In 1981, the first HIV/AIDS epidemic occurred in the Democratic Republic of Congo because of a crossover between humans and chimpanzees. It was later declared a pandemic as it was affected by countries worldwide. Countries that were most affected were Ethiopia, India, Kenya, Nigeria and South Africa. HIV is a virus that progressively destroys the body to fight infections and this can cause AIDS (acquired immunodeficiency syndrome). HIV has been able to kill 33 million people. It is spread by unprotected sex, sexually transmitted infections, the share of needles for the use of drugs and unsafe injections, piercings and blood transfusions. HIV/AIDS in the long term leads to numerous social impacts on the community such increase in

20 "Manual for the Control of the Highly Pathogenic Avian Influenza", *Department of Veterinary Services*, Kementarian Pertanian Dan Industri Asas Tani, https://www.oie.int/fileadmin/database/ASIA/Malaysia/Manual_for_the_control_of_Highly_Pathogenic_Avian_Influenza_(HPAI)_Malaysia.pdf

crime rates, poverty, drug abuse, illiteracy, reduced productivity and eventual collapse of the social system.[21] The World Bank approximation shows that the GDP of South Africa was reduced by 20% in 2010 because of AIDS. In addition, the USA's expenditure for HIV/AIDS was $8.5 billion in 1991. There is no cure for HIV, but treatments have been developed. The first treatment for HIV was introduced in 1987 and it was called Azidothymidine. Since then there has been a treatment called ART (AntiRetroviral Therapy) where it is required to take a combination of medicines everyday. Between 2000 and 2019, new HIV infections fell by 39% and HIV-related deaths fell by 51%, with 15.3 million lives saved due to ART. [22]

Effects of outbreaks

Economic disruption

There are vast economic losses due to the efforts which include and are not limited to quarantine, disease surveillance systems, more intense hospital and medical service, in order to prevent and contain and eradicate the disease.It is expected that during a lockdown, tourism is halted, businesses shut down, heavy costs to the health care systems, resulting in a loss in the country's GDP. For example, in the 1994 outbreak of both bubonic and pneumonic plague in India, trade and travel restrictions were imposed internally and externally, which led to economic impacts that shocked the region's stock markets with losses of nearly $2 billion. Losses through the market can result from changes in consumption patterns, can heavily affect prices and can cause long-term problems. For example, the spread of the Asian Avian Influenza(HPAI H5N1) caused international chicken prices to inflate in major poultry markets in Europe, Africa, and the Middle East. The EU's total ban of beef and cattle exports from the United Kingdom in March 1996 resulted in the loss of trade estimated at £700 million per year. The Bovine spongiform encephalopathy (BSE) cost the US $11 billion in 2003-2007. China, Taiwan, Hong Kong, and Singapore caused US$200 billion. The world economy lost up to $3 trillion because of the severe HPAI pandemic.

[21]"ImpactofHIVonSociety."*NursingAnswers.net*,nursinganswers.net/essays/hiv-aids-effects-on-community-health-and-social-care-essay.php#:~:text=HIV/AIDS in the long,eventual collapse of social system.
[22]"HIV/AIDS."*World Health Organization*, World Health Organization, www.who.int/news-room/fact-sheets/detail/hiv-aids.

Social Disruption

Whenever outbreaks of zoonotic diseases occur, social problems are bound to arise. The first action that usually takes place as soon as an outbreak is identified is a lockdown. This means that travel of any sort is prohibited, establishments of education, hotels and restaurants,non-essential stores, religious places and any forms of leisure and entertainment must remain closed. Outbreaks have an educational impact as students no longer can go to schools or universities, forcing them to take part in online school which is not of easy access to most students. UNESCO reported that during the COVID-19 pandemic 1.5 billion students were affected in 165 countries. There is also a psychological impact of outbreaks, especially if they last longer than intended. There is a fear for a potential spike in suicides due to loss of jobs, isolation, financial problems and loss of family members.

Political Disruption

Outbreaks of zoonotic diseases can cause political problems especially if the outbreaks later turn into pandemics. For example, the Communist party of China (CPC) was dismissed over the handling of the quarantine in central China. Experts are worried that people will riot against the General Secretary of CPC Xi Jinping because they are angry due to the coronavirus pandemic. President Donald J. Trump has been heavily criticised because of his response to the pandemic due to his attempts to devalue the severity of the situation and his false accusations. American citizens are angry at the government as they have come to realise that their healthcare system is weak and is not able to support outbreaks of any sort. Moreover, in Iran two dozen members of the Iranian legislature and another 15 people government officials, including the vice-president Eshaq Jahangiri, have been diagnosed with COVID-19. The coronavirus is making the people of Iran worry whether the regime will be able to continue. COVID-19 also made it evidently clear of how much countries heavily relied on China in terms of manufacture of goods.

Major countries and organizations involved

USA

The USA has been affected by various zoonotic diseases and they are Salmonellosis, Avian Influenza, West Nile Virus, Plague (pneumonic), BSE, coronaviruses (including SARS CoV-2 and currently COVID-19) and rabies. The USA lost $11 billion because of the BSE epidemic of 2003-2007 and they lost another $400 million due to the outbreak of the West Nile Virus. The US is currently the country with the most COVID-19 cases as it has 3,479,000 cases and rapidly rising with tens of thousands of cases each day since March. President Donald J. Trump issued a proclamation limiting entry into the US. 32 out of 50 states had gone under lockdown by March as an attempt to control the number of cases.National unemployment in the USA rose to 14.7%. President Trump signed into law the Families First Coronavirus Response Act (FFCRA), providing additional flexibility for state unemployment insurance agencies and additional administrative funding to respond to the COVID-19 pandemic. [23] As a result of COVID-19's impact on the economy, President Trump signed into law the CARES Act which is a $2 trillion economic relief package to provide economic assistance to businesses, workers and families. A report has shown that the US spent $171.8 billion in 2016. [24] The US has been the largest single funder to the WHO donating 15% of its 2018-2019 budget and managed to give more than $400 million within two years. However, as of April 2020, the US cut funding for WHO.

China

China has been affected by a various number of zoonotic diseases such as HPAI, Avian Influenza H7N9 and rabies. It has also been the origin of SARS- CoV-2 and COVID-19.The SARS outbreak caused China economic growth to slow down from 11.1% year after year to 9.1%. Retail sales and industrial production slowed down in 2003 affecting China's economy. It could be seen that China was not clear and upfront with the number of cases of SARS in 2003-2004 and it was allegedly called a cover up. In December of 2019, the first COVID-19 case was recorded. On 23 January 2020,

23 "Unemployment Insurance Relief During COVID-19 Outbreak." *U.S. Department of Labor Seal*, www.dol.gov/coronavirus/unemployment-insurance.

24 *Research!America*, www.researchamerica.org/.

China announced a quarantine on Wuhan preventing travel in and out of Wuhan. Due to the rapid increase of cases, China had 1,000 bed hospitals built in seven days in order to withstand the cases. The lockdown caused unemployment to rise to 6% in April. 460,000 companies closed in the first quarter alone. All of this caused China's GDP to shrink by 6.8% in three months.

Democratic Republic of Congo

DRC has been the first country where Ebola was detected and also had numerous zoonotic diseases such as yellow fever, HPAI and currently COVID-19. DRC had 3,481 cases of Ebola as of 3 July 2020. The Democratic Republic of Congo received aid from the Mercy Corps which was founded by the United States. They responded to the DRC with water, sanitation, infection prevention control and community engagement. [25] The Ebola epidemic caused borders and airlines to halt. There was a decrease in agriculture production such as cassava, bananas, palm oil and fruits.The rVSV-ZEBOV-GP vaccine was being used in the ongoing 2018-2019 Ebola outbreak in DRC.The 10th outbreak of Ebola in Democratic Republic of Congo has been declared over.

Italy

Italy spends 9.3% of its GDP[26] on health care and according to WHO it has ranked Italy second on having the overall efficiency in healthcare.[27]Italy has been affected by HPAI, SARS, MERS-CoV, Chikungunya and very few cases of Ebola. Italy was the first European country to be heavily affected with the ongoing COVID-19 with 243,000 cases and 34,900 deaths. They have since flattened out the curve. Despite Italy's ranking, they were overwhelmed with the cases and were unable to contain it. By the end of February 2020 Italy's cases bagan to spike and by March, Prime Minister Giuseppe Conte imposed a lockdown on all 60 million citizens. Roberto Gualtieri, an

25 "The Ebola Effect: The Economic Impacts of a Public Health Crisis - Democratic Republic of the Congo." *ReliefWeb*, reliefweb.int/report/democratic-republic-congo/ebola-effect-economic-impacts-public-health-crisis.

26 "Health Care Quality in Europe and Scandinavia: Italy, France, Germany, Sweden, Norway, Denmark, the UK and Norway."*AetnaInternational*,www.aetna international.com/en/about-us/explore/living-abroad/culture-lifestyle/health-care-quality-in-europe-and-scandinavia.html.

27 Tandon, Ajay, "Measuring overall Health System Performance for 191 Countries", *World Health Organisation*, World Health Organisation, https://www.who.int/healhinfo

economy minister, said that a 6% GDP contraction is realistic as the tourism industry was forced to be halted.

Russia

Russia is the world's largest country and their public control is insufficient because of the lack of funding for treatment, vaccine prophylaxis and health education. Russia has generally been affected by a few zoonotic diseases some of which are Brucellosis and rabies. When COVID-19 was first discovered in China, Russia closed down its borders with China in January before matters escalated. This helped Russia contain the number of cases in Russia up until April where there was a massive outbreak of COVID-19 and they have 647,800 cases as of June. Despite all the cases, Russia has a fatality rate of only 0.9%. The outbreak of the zoonotic virus has caused Vladimir Putin, the president, to delay a $360 billion national investment plan for six years due to the fact the coronavirus has caused an economic recession.The plummeting oil prices as there was a lack of demand from airlines, drivers and shipping companies, causing Russia to dip into the $500 billion in budget revenue.

Global Virome Project

An organisation that is partnered in the World Health Organisation that plans to detect and characterize viruses from all around the world and their genetic information and is funded by the USA. The Global Virome project builds on PREDICT which is a USAID program and they have been able to discover 1000 viruses in both animals and humans. They have been able to develop new technology for the sole purpose of improving their ability to prevent future pandemics. Moreover, they provide necessary information towards the development of vaccines to pharmaceutical companies. According to the Global Virome Project they also "Inform health policy, patient treatment, animal conservation, the global economy, and build a world safe from the threat of emerging viral diseases."[28]

PREDICT

28 "Our Approach." *Global Virome Project*, www.globalviromeproject.org/our-approach.

PREDICT is a liable organisation by the Global Virome Project and is supported by the US Agency for International Development (USAID) for the research of epidemiology and was described as an early warning pandemic system. Operated in over 30 countries for10 years, PREDICT was able to strengthen surveillance systems and laboratory diagnostic capabilities for both known and unknown viruses. It used the One Health approach. The project investigated the behaviors as well as the ecological and biological factors driving disease emergence, transmission, and spread inorder to get to the root of the problem. PREDICT has managed to successfully train 2,500 people in biosafety,laboratory diagnostics, social sciences and modeling and analytics. The project ended in March 2020 when the Trump Administration cut the fundings.

Mediterranean Zoonoses Control Programme (MZCP)

An interregional (Mediterranean and Middle East) Programme on Zoonoses and Foodborne Diseases prevention, surveillance and control through intersectoral collaboration and coordination.Bulgaria, Cyprus, Egypt, Greece, Lebanon, Kuwait, Portugal, Saudi Arabia, Spain, Syrian Arab Republic and Turkey are the participating countries in this programme. The MZCP has been able to promote, at both national and regional levels, programmes for the prevention, surveillance and control of zoonoses and related foodborne diseases. Furthermore, it has strengthened the collaboration between national animal health and public health services. Implementation of training courses for public health and animal health personnel and laboratory staff increased as a result of the MZCP.

The Pandemic Influenza Preparedness (PIP) Framework

An organisation that brings together Member States, industry, other stakeholders and WHO to implement a global approach to pandemic influenza preparedness and response. Its key goals include: - to improve and strengthen the sharing of influenza viruses with human pandemic potential; and - to increase the access of

developing countries to vaccines and other pandemic related supplies.[29]$2.7 million was invested in regional capacity-building and US$ 4.6 million directly in the priority countries which were prone to zoonotic diseases. Countries were supported to strengthen influenza diagnostic capacities to improve detection.

World Organisation for Animal Health

It is an intergovernmental organisation founded in 1924 in Paris, France with 181 member countries and its aim is to improve animal health worldwide and to fight animal diseases at a global level. It has released full reports about HPAI and BSE to provide analysis of the current global situation from the OIE expertise network. The reports briefly present the key risks driving events - how the strains are interacting with hosts and how the events may evolve in the months ahead.

Research & Development (R&D) Blueprint

The R&D Blueprint was set up by WHO for action to prevent epidemics. It has accelerated diagnostics, vaccines and therapeutics for COVID-19. It created a plan to develop a vaccine, research into potential pharmaceutical treatments and strengthen channels for information sharing between countries during a pandemic.

Food and Agriculture Organisation of the UN

The Food and Agriculture Organisation was set up in 1945 and its headquarters are currently in Rome,Italy. It aims to help eliminate hunger, food insecurity and malnutrition as well as reducing rural poverty. In 2006, the FAO established a partnership with the World Organisation for Animals in order to assess the epidemiological situation and set up measures to prevent animal diseases spreading. According to FAO, they “implement animal health programmes related to the establishment of best practices in the prevention and control of priority diseases which threaten animal production, public health and trade through its international and regional networks, animal health projects and disseminating practical information.”

29 “Pandemic Influenza Preparedness (PIP) Framework.” *World Health Organization*, World Health Organization, 15 June 2020, www.who.int/influenza/pip/en/.

Timeline of events

Date	Description of event
1346-1353	The Bubonic Plague originated in China and was brought over to England through merchant ships. It gradually spread throughout Europe and it managed to kill 25 million people in Europe.
1648	First evidence of yellow fever in the Americas as it was imported from West Africa.
1668-1699	Outbreaks of the yellow fever in Northern USA
1898	Formation of the Reed Yellow Fever Commission
1918	Spanish Flu outbreak started in Kansas, USA and spread to Europe through soldiers because of World War 1. An immediate lockdown took place, shutting down schools, businesses and all public spaces.
1930	Two vaccines developed for yellow fever- 17D and the French neurotropic vaccine
1933	First commercial planes were introduced meaning viruses were easier to spread to new places.
1976	Ebola virus (EBOV) and Sudan virus were discovered
1981	HIV/ AIDS pandemic occurred starting in the Democratic Republic of Congo
1986	There was a Bovine spongiform encephalopathy (BSE) outbreak first in the UK.
1987	Azidothymidine was introduced as a treatment for HIV
1989	Britain bans human consumption of certain organs of cows in an attempt to reduce the BSE cases. The U.S. prohibits the import of live cattle, sheep, bison, and goats from countries where BSE is known to exist in native cattle.

1990	The Human Genome Project was established in order to study the base pairs that make up human DNA and to map out genetic coding of viruses.
1994	India had an outbreak, in August, of bubonic and pneumonic plague up until October. This outbreak cost the country $600 million because if the trade and travel restrictions were imposed internally and externally
1996	Britain destroys 4.5 million cattle once they admitted thay BSE can be transmitted to humans in a different form.
1999	The USA had an outbreak of West Nile virus fever till 2008. It cost the United States $400 million.
2002	SARS- CoV outbreak in Guangdong, China. The countries that were affected most by SARS are China, Taiwan, Hong Kong, Singapore and Canada. $200 billion dollars was lost in the East Asiann economy and in Canada $1.5 billion
2003	CDC implemented travel advisory for SARS and quarantine was obligatory to people coming from China, Singapore and Vietnam or the United States. [30]
2004	Highly pathogenic Avian influenza (HPAI H5H1) epidemic in 7 main countries (Bangladesh, China, Egypt, India,Indonesia, Malaysia and Vietnam). Worldwide the pandemic had an economic impact of $3 trillion. In Asia alone, the pandemic cost $10 billion.
2009	H1N1 outbreak in North America which later was named a pandemic by WHO.
2009	Epidemiological research program funded by a United States Agency for International Development (USAID) grant. Launched in 2009, the program was described as an early warning pandemic system.
2010	The FDA announced its approval of four 2009 H1N1 influenza

30 "CDC SARS Response Timeline." *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 26 Apr. 2013, www.cdc.gov/about/history/sars/timeline.htm.

	vaccines.
2011	PIP framework established to prepare for a future pandemic influenza
2014	First Ebola case discovered in Texas, USA causing mass panic.
2018-2019	The rVSV-ZEBOV vaccine is being used in the ongoing 2018-2019 Ebola outbreak in DRC(Democratic Republic of Congo) [31]
2019-ongoing	COVID-19 pandemic in 213 countries starting in Wuhan, China.
2019-2020	Immediate closure of schools, non-essential shops, non-essential production and recreational venues. Curfews and stay-at-home orders were implemented in order to contain the COVID-19 cases.

Previous attempts to solve the issue

The Pandemic Influenza Preparedness

The Pandemic Influenza Preparedness (PIP) Framework brings together Member States, industry, other stakeholders and WHO to implement a global approach to pandemic influenza preparedness and response. Its key goals include: - to improve and strengthen the sharing of influenza viruses with human pandemic potential; and - to increase the access of developing countries to vaccines and other pandemic related supplies.[32] The PIP framework has managed to offer help on the sharing of zoonotic diseases that require a rapid response. However, the PIP framework can

31 "Ebola Virus Disease." *World Health Organization*, World Health Organization, www.who.int/news-room/fact-sheets/detail/ebola-virus-disease.

32 "Pandemic Influenza Preparedness (PIP) Framework." *World Health Organization*, World Health Organization, 15 June 2020, www.who.int/influenza/pip/en/.

only work effectively if all member countries agree to share viruses and there is clarification on genetic sequence data. It has been effective in terms of sharing vaccines and the sharing of information regarding influenza viruses and this is beneficial as it speeds up the process of terminating an epidemic.

The International Health Regulations

The International Health Regulations (2005) or IHR (2005) are an international law which helps countries work together to save lives and livelihoods caused by the international spread of diseases and other health risks. The IHR (2005) aims to prevent, protect against, control and respond to the international spread of disease while avoiding unnecessary interference with international traffic and trade.[33]Although many countries do not yet have all the capacities required by the International Health Regulations (IHR), there has been overall an improvement in country capacity for prevention, detection and response to health risks of potential international concern.[34]It is effective as it outlines a countries' rights and obligations to provide aid to its citizens during a public health emergency. It has done so by providing a legal framework that is provided to each country, which is then used by each country as a basis of their further actions and attempts.

Global Early Warning System for transboundary animal diseases

A new FAO/OIE/WHO initiative called GLEWS (global early warning system for transboundary animal diseases) was identified as a possible platform for enhancing global surveillance and response to zoonotic diseases.[35]

33 "Frequently Asked Questions about the International Health Regulations (2005)." *World Health Organization*, World Health Organization, 18 Aug. 2009, www.who.int/ihr/about/faq/en/.

34 Leite, Paulo. "PAHO/WHO: Countries Describe Challenges, Achievements in Implementing International Health Regulations." *Pan American Health Organization / World Health Organization*, 19 May 2014, www.paho.org/hq/index.php?option=com_content&view=article&id=9608%3A2014-paises-debaten-logros-desafios-implementacion-reglamento-sanitario-internacional&Itemid=40718&lang=en#:~:text=Although%20many%20countries%20do%20not,risks%20of%20potential%20international%20concern.

35 "Report of the WHO/FAO/OIE joint consultation on emerging zoonotic diseases."World Health Organisation, World Organisation for Animal Health, 3 May. 2004, https://www.oie.int/doc/ged/D5681.PDF

FAO, OIE and WHO have joined their efforts and developed a Global Early Warning System for animal diseases aiming at providing national animal health authorities with epidemiological information enhanced by an in-depth analysis on the occurrence and spread of major diseases. This system is defined as a tool to be for the international community and stakeholders like to assist in predicting and preventing livestock animal disease threats, including emerging zoonoses through epidemiological analysis and the integration of additional factors that might have an impact on the occurrence and spread of such diseases.[36] GLEWS has been effective due to the fact that it tracks further the spread of zoonotic diseases and assesses whether information is credible from the global human and veterinary public health committees. This helps in making sure that the right information can be used towards the development of vaccines.

Relevant UN Resolutions, Events, Treaties and Legislation

Resolution WHA63.1

This resolution discussed the pandemic influenza preparedness and the sharing of influenza viruses and access to vaccines[37]. This resolution eventually led to the creation of the Pandemic Influenza Preparedness Framework.

The Pandemic Influenza Preparedness (PIP) Framework

PIP brought together Member States, industry, other stakeholders and WHO to implement a global approach to pandemic influenza preparedness and response. Its key goals include: - to improve and strengthen the sharing of influenza viruses with

36 "Report of the WHO/FAO/OIE joint consultation on emerging zoonotic diseases."World Health Organisation, World Organisation for Animal Health, 3 May. 2004, https://www.oie.int/doc/ged/D5681.PDF
37 "Resolutions", *World Health Organisation*, World Health Organisation, https://apps.who.int/gb/ebwha/pdf_files/WHA63-REC1/WHA63_REC1-P2-en.pdf

human pandemic potential; and - to increase the access of developing countries to vaccines and other pandemic related supplies.[38]

One Health

In October 2009, a General Assembly took place in Seoul, South Korea to discuss the collaboration and communication between human medicine and veterinary medicine whenever there is an increased risk of a zoonotic disease. An initiative called “One Health” was set up in order to do so. [39]

Resolution 2532

The Security Council in a conference meeting on July 1st announced its decision to adopt a resolution expressing its support for the Secretary-General’s appeal for a global ceasefire, which he passed in March to help fight COVID-19 in unification.

They called upon all parties to armed conflicts to engage immediately in a humanitarian pause for 90 consecutive days, to enable the safe and sustained delivery of humanitarian assistance and provision of related services by impartial humanitarian actors, in accordance with the humanitarian principles of humanity, neutrality, impartiality and independence.

Resolution 74/ 274

“International cooperation to ensure global access to medicines, vaccines and medical equipment to face COVID-19”.[40]

The Assembly affirmed the role of the UN in coordinating the global response to control and contain the spread of COVID-19 and in supporting Member States.

38 “Pandemic Influenza Preparedness (PIP) Framework.” *World Health Organization*, World Health Organization, 15 June 2020, www.who.int/influenza/pip/en/.

39 “WMA - The World Medical Association-WMA Resolution on Collaboration between Human and Veterinary Medicine.” *The World Medical Association*, www.wma.net/policies-post/wma-resolution-on-collaboration-between-human-and-veterinary-medicine/.

40 “Amid COVID-19 Pandemic, General Assembly, in Silence Procedure, Adopts 7 Resolutions, 13 Decisions between 27 March and 14 May | Meetings Coverage and Press Releases.” *United Nations*, United Nations, www.un.org/press/en/2020/ga12244.doc.htm.

Member States to help to prevent actions that could hinder access to safe, effective and affordable essential medicines, vaccines, personal protective equipment and medical equipment required to address COVID-19.[41]

Possible solutions

Firstly, what is required in order to control and address the problems we are facing because of zoonotic viruses, is to continue doing surveillance on which animals transmit the viruses, to isolate the problem. This means that better diagnostics and identification is required along with more extensive studies on the epidemiology of the viruses

Moreover, it is advised for humans to limit their exposure to wildlife as it increases the likelihood of us catching a certain disease or virus and thus later transmitting it to other people, leading to an outbreak. This increases the chances for viruses to select for some mutations that would benefit the virus in terms of replicating in a human. This later is transmitted to other people, leading to an outbreak.

Developing, strengthening and implementing integrated surveillance systems would also be beneficial. Meaningful surveillance protocols should be developed in a research mode and evaluated for their ability to anticipate and prevent human disease. [42]

Strengthening the capacity of laboratories to test for virus infections worldwide is important in order to be able to investigate extensively any outbreaks and be able to produce reliable results that can be used to further assess the situation. In order to do so, sufficient funding is required and properly trained experts are also required.

41 "Amid COVID-19 Pandemic, General Assembly, in Silence Procedure, Adopts 7 Resolutions, 13 Decisions between 27 March and 14 May | Meetings Coverage and Press Releases." *United Nations*, United Nations, www.un.org/press/en/2020/ga12244.doc.htm.

42"The Emergence of Zoonotic Diseases." *Google*, Google, books.google.gr/books/about/The_Emergence_of_Zoonotic_Diseases.html?id=DOuYWK_qzokC&printsec=frontcover&source=kp_read_button&redir_esc=y#v=onepage&q&f=false.

Raising awareness on personal hygiene is a key solution to this problem. Keeping the hands clean by washing them right after being around animals is an important step to take, in order to avoid getting sick and spreading germs to others. The use of hand sanitizer with alcohol is also ideal in order to get rid of germs.

Preventing bites from vectors such as mosquitoes, ticks, and fleas is important as many zoonotic diseases, such as West- Nile virus, Malaria and Dengue Fever, are carried by vectors. Implementing insecticide-resistance management strategies in malaria-endemic countries in order to control the spread of vectors. Further knowledge is required in order to understand how insecticide resistance works and possible new approaches to solve this problem.

Finally, countries need to develop a better response capacity to zoonotic diseases outbreaks and so they need to be more prepared by establishing strong health care systems, by implementing better animal and human infrastructure as well as increasing the support towards basic training.

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